Food and Agriculture Organization of the United Nations

Sustainable Forest Management Impact Program on
DRYLAND SUSTAINABLE LANDSCAPES
One country, one champion

Transforming Malawi landscapes and livelihoods through integrated food and energy systems

Intercropping maize and pigeon peas to combat drought and achieve land degradation neutrality

COUNTRY CONTEXT

In Malawi, forest degradation is increasing due to agricultural expansion and rising charcoal production as alternative income sources. This issue is compounded by the limited adoption of sustainable land management practices, primarily due to inadequate access to agricultural and forest extension services.

Additionally, income opportunities are restricted, with low agricultural productivity and fluctuating crop prices. The lack of access to quality seeds further hinders farmers' ability to grow crops better suited to local climatic and soil conditions, undermining sustainable agricultural practices.

Without addressing these challenges, household livelihoods and landscape resilience remain at risk and pressure on natural resources is likely to increase.

The Integrated Food and Energy System (IFES) is a sustainable agricultural approach that combines the cultivation of food crops with energy-crops, including legumes. IFES contributes to more resilient and productive farming systems, while improving livelihoods, and reducing land degradation and pressure on forest resources. This method effectively addresses challenges such as climate change, deforestation, and low agricultural productivity.

In Malawi, farmers are implementing IFES by intercropping maize (or other staple food crops) with pigeon pea *(Cajanus cajan (L) Millsp)*. This practice is leading to increased resilience and diversified income, while also promoting the conservation of the Miombo-Mopane woodlands by reducing reliance on traditional firewood.

Pigeon peas are particularly valuable due to their high woody biomass, which can serve as a fuel source for household cooking and water boiling, thus contributing to energy security (Orr et al., 2015). Additionally, they provide protein-rich food for human consumption and fodder for livestock (Bogdanski, 2012), while improving soil fertility through nitrogen fixation (Kabambe *et* al., 2018). By integrating pigeon peas into cropping systems, farmers can address land degradation effectively, alleviating pressure on forest resources, enhancing soil health and increasing agricultural productivity.

However, farmers in Malawi face challenges in accessing quality seeds and essential training, which are crucial for ensuring this approach is successful and efficient in utilizing available land resources.

Against this backdrop, the FAO-led Dryland Sustainable Landscapes Impact Program (DSL-IP) and partners are working with Malawi Forest and Farm

KEY FACTS

Sustainable Landscapes Production Framework (SLPF)

A framework to harness positive agriculture-forestry-energy linkages by providing capacity development and income generating opportunities.

Geographic scope

Mangochi, Ntcheu and Balaka Districts, Malawi.

Source: United Nations Geospatial. 2011. Map of Malawi. In: United Nations. New York, USA, UN. [Cited 4 July 2024]. https:// www.un.org/geospatial/content/malawi

Note: Refer to the disclaimer on the last page for the names and boundaries used in this map.

Target group

Forest and Farm Producer Organizations (FFPOs) and Community members

Gender

Based on the assessments undertaken in the landscape, 43 percent of households are female led. The approach focuses on gender-inclusive interventions to empower women and ensure equitable participation in value chains.

Type of shock/crisis

Over the past three years, 80 percent of FFPO members experienced climatic shocks, including drought and floods.

SHOUT
SHARE
IT

Targeted interventions start with understanding the landscape - ILAM ensures decisions are backed by evidence.

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Producer Organizations (FFPOs) to strengthen and upscale this innovative and farmer-owned practice.

Championing this approach, Malawi serves as a model for other countries in the region grappling with similar management challenges.

Through the provision of tailored technical capacity building, the DSL-IP is committed to working with land user groups and local Government institutions to improve livelihoods, meet Land Degradation Neutrality (LDN) targets, and promote drought resilience and sustainable forest and land management practices.

EVIDENCE-BASED, TARGETED AND TAILORED INTERVENTIONS

To ensure interventions are tailored and impactful, the DSL-IP is implementing the Integrated Landscape Assessment Methodology (ILAM) - a multi-level approach combining geospatial and household-level data. At the local level, assessments are guided by the SHARP+ tool, capturing how rural households manage natural resources and adapt to climate risks in Mangochi, Ntcheu and Balaka districts.

The graph below, based on ILAM-SHARP+ surveys conducted in over 400 households, illustrates the benefits observed by those already practicing IFES, as well as key challenges and barriers identified by households in Malawi's targeted Miombo-Mopane landscapes.

OBSERVED BENEFITS OF INTEGRATED FOOD AND ENERGY SYSTEMS (IFES)

CHALLENGES/BARRIERS TO IFES

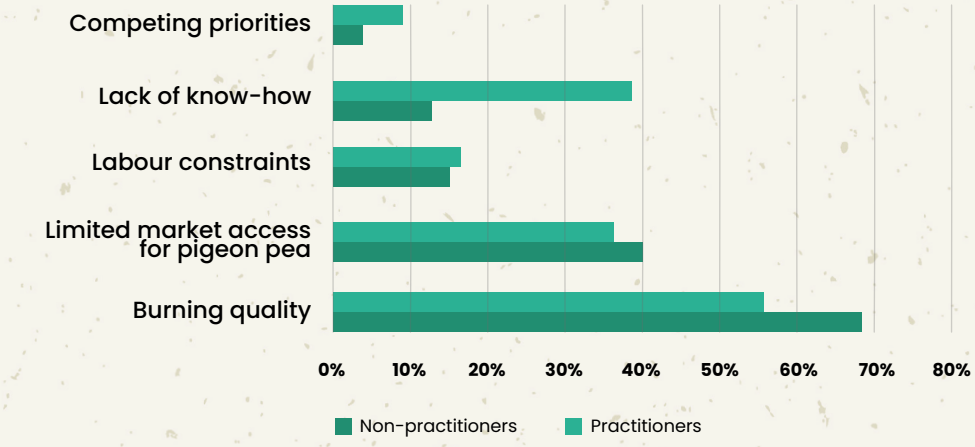

Figure 1: Motivations and barriers to implementing IFES among farmers in the project landscapes (n=416)
Source: Buhrow, A., Johnston, S. & Lemaitre, A. 2025. Resilience and behaviour change assessment report using the SHARP+ methodology: Author's elaboration based on the SHARP+ Behavioural Change Household Survey carried out in Ntcheu, Balaka and Mangochi districts of Malawi. Unpublished internal consultancy report. Drylands Sustainable Landscapes Impact Programme. FAO. Rome.

Strengthening IFES means empowering farmers with knowledge, resources, and market opportunities.

STRENGTHENING AND UPSCALING IFES: THE DSL-IP IN MALAWI

The DSL-IP is assisting Malawi in strengthening and upscaling IFES and sustainable land management by applying an integrated and holistic approach. The so-called **Sustainable Landscapes Production Framework (SLPF)** aims to empower farmers not only with essential knowledge and skills but also with the financial and resource means for the effective implementation of these practices, while fostering community engagement. In practice, this encompasses:

- Providing practical, hands-on training on sustainable land and forest management practices through **Farmer Field Schools;**
- Establishing **Community Seed Banks**, to improve access to quality seeds and drought tolerant crops such as pigeon pea; and
- Providing support to develop group-based business model around pigeon pea with **Forest and Farm Facilities**, including value addition for processing into various products (e.g. dhal and animal feed powder) and sale to high-profit markets, with the objective of making sustainable landscape production financially attractive.

By combining these initiatives in an integrated and country-adapted manner, the framework seeks to sustainably increase productivity, improve livelihoods, and enhance the resilience of farmers, land users and communities, while addressing land degradation processes. Achieving sustainable agriculture, forestry and livestock production requires a systems-thinking approach that focuses not only on boosting productivity but also ensures the long-term health of the environment. Evidence indicates (Chomba et al., 2024) that, by adopting sustainable land management practices, farmers can produce high-quality products that meet the demands of green value chains, generating higher incomes and supporting the conservation of natural resources.

FARMING SYSTEM CHALLENGE	COMMODITY POTENTIAL FOR SYSTEM TRANSFORMATION	HOW THE SUSTAINABLE LANDSCAPES PRODUCTION FRAMEWORK SUPPORTS DELIVERY OF BENEFITS
IMPACT AREA: **Livelihoods and Gender Equality**		
Unreliable harvests due to erratic rainfall and climate shocks.	Pigeon peas ensure reliable harvests during droughts, thriving in low rainfall conditions (Choudhary et al., 2011) while improving water availability for maize (Sekiya & Yano, 2004).	**Farmer Field Schools (FFS):** Demonstrations and peer learning on drought-resilient intercropping and integration of pigeon pea to reduce climate shock impacts; Community **Seed Banks (CSB):** Community access to drought-tolerant pigeon pea varieties; **Forest and Farm Facility (FFF):** Support to producer organizations to market pigeon pea products.
Women and girls are mainly responsible for firewood collection, limiting time availability for other tasks.	Grown close to home, pigeon pea stems provide an easily accessible fuel source, minimizing the time women and girls spend on firewood collection (Aggarwal & Steckel, 2022).	**FFS:** Promote and showcase the use of pigeon pea stems for household fuel material through farmer learning; **CSB:** Ensure availability of multipurpose varieties with good fuelwood properties; **FFF:** Strengthen women's groups and producer organizations to scale up adoption and access markets for surplus.
Poor dietary diversity and hidden hunger in rural areas.	Pigeon pea pods provide a nutritious source of food for households, contributing to increased dietary diversity and food security (Saxena et al., 2010).	**FFS:** Nutrition-focused modules in field schools, emphasizing nutritional benefits of pigeon pea; **FFF:** Collective marketing of pigeon pea as a food crop, linking to school feeding programs or local markets.

FARMING SYSTEM CHALLENGE	COMMODITY POTENTIAL FOR SYSTEM TRANSFORMATION	HOW THE SLPF SUPPORTS DELIVERY OF BENEFITS
IMPACT AREA: **Land Degradation Neutrality**		
Declining soil fertility due to continuous maize mono-cropping and low adoption of SLM practices.	Pigeon pea enriches the soil with nitrogen, benefiting the maize crop grown alongside and reducing the need for synthetic fertilizers.	**FFS:** Demonstrate soil fertility management with legumes, emphasizing synergetic practices focusing on fuel use and nutrient management; CSB: Provide access to soil-enriching pigeon pea varieties
Soil erosion and moisture loss due to poor ground cover and intense rainfall.	The integration of high-biomass pigeon pea varieties increases soil cover, improves moisture retention, and stabilizes soil during floods.	**FFS:** Train on soil cover and residue management
Expansion into forested areas due to low on-farm productivity.	Increased agricultural productivity and yield stability reduce the necessity for expanding farming into forested areas, thereby supporting conservation efforts.	**FFS:** Promote sustainable intensification practices; CSB: Provide seed diversity to boost productivity.
IMPACT AREA: **Upscaling of Good Practices**		
There are high prospects for promoting Integrated Food and Energy System in Malawi and across the Miombo-Mopane ecoregion, with many local producers already engaging in pigeon pea cultivation and using crop residues as fuel material.		
Integrated Food and Energy System is a low-cost and scalable approach, using local materials and traditional knowledge while delivering rapid livelihood returns. This makes the approach easy to adopt for smallholders with limited resources.		

Table 1: Pathways to Land Degradation Neutrality: How Integrated Food and Energy Systems Restore Dryland Ecosystems
Source: Author's elaboration.

Even with its high prospects for addressing livelihood and Land Degradation Neutrality challenges, difficulties remain regarding the combustion quality of pigeon pea stems and efficiently harnessing synergy potentials of integrating pigeon pea into intercropping systems. The IFES as promoted in the DSL-IP project in Malawi addresses these challenges, providing farmers with access to varieties of pigeon peas with diverse characteristics (such as stature and architecture, early or late development, pod palatability and nutritional content, combustion quality, etc.) that can be integrated into a range of different (inter)cropping systems and cater to various agricultural needs and priorities.

The DSL-IP is working closely with the Government of Malawi to ensure lessons learned can inform the adoption of IFES in similar landscapes, ultimately enhancing productivity, resilience, and sustainability across the region. In 2024, the DSL-IP Regional Exchange Mechanism based in the region brought together over 100 stakeholders from 10 countries to the Mulanje District in Malawi, so they could experience the system in person.

In conclusion, the implementation of IFES in Malawi presents a promising pathway for addressing the interconnected challenges of food insecurity, environmental degradation, and economic instability within the Miombo-Mopane woodlands. By promoting the dual cultivation of pigeon pea and maize, this initiative not only enhances agricultural productivity and resilience to climate impacts but also supports local livelihoods and biodiversity conservation. As Malawi continues to scale up these innovative practices, the potential for improved food and energy security, increased income, and environmental stewardship becomes increasingly achievable.

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